

REMARKS

The present claims relate to an electrode and a gallium nitride-based compound semiconductor light-emitting device.

Amendment summary

Claim 1 is amended to recite that the first layer is a continuous layer in contact with a surface of a p-contact layer in a gallium nitride-based compound semiconductor light-emitting device. Conversely, the claim is also amended to recite that the second layer is parted in plural portions on the surface of the p-contact layer, i.e., the second layer is not a continuous layer.

Support for this amendment is found, e.g., in Figure 1 and on page 16, lines 15-27 of the specification.

No new matter is added by this amendment, and Applicant respectfully submits that entry of this amendment is proper.

Status of the claims

In the Office Action mailed February 9, 2007, claims 1 and 3-16 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by an Chen et al (“Microstructural investigation of oxidized Ni/Au ohmic contact to p-type GaN”) (hereinafter “Chen”). Claim 2 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chen in view of Sheu et al (“The effect of thermal annealing on the Ni/Au contact of p-type GaN) (hereinafter “Sheu”). Finally, claim 16 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chen in view of Chen et al. (U.S. Patent Application Publication No. 2003/0010994) (hereinafter “ChenJ”).

Response to rejection of claims 1 and 3-16 under 35 U.S.C. § 102(b) based on Chen

Independent claim 1 recites an electrode for use in a gallium nitride-based compound semiconductor light-emitting device comprising a continuous light-permeable first layer which is in contact with a surface of a p-contact layer in a gallium nitride-based compound semiconductor light-emitting device and which is capable of providing ohmic contact, and a second layer which is in contact with a part of a surface of said p-contact layer. The first layer comprises a metal, or an alloy of two or more metals, selected from a first group consisting of Au, Pt, Pd, Ni, Co, and Rh, and the second layer comprises an oxide of at least one metal selected from a second group consisting of Ni, Ti, Sn, Cr, Co, Zn, Cu, Mg, and In. In addition, the second layer is parted in plural portions on the surface of the p-contact layer.

As seen in Figure 1, the first layer (11) comprised of a metal or alloy exists continuously in contact with a surface of a p-contact layer (6). Applicant notes that pore (14) in Fig. 1 has a diameter of only 50 to 200 nm (see page 8 line 1 to 2 in the present specification), and therefore does not break the plane surface continuity of the first layer.

In addition, Figure 1 illustrates that the second layer (12) comprised of a metal oxide is parted in plural portions on the surface of a p-contact layer (6). In other words, the second layer exists in the form of islands within the continuous first layer.

Hence, according to the present invention, an electrode having excellent light permeability and low contact resistance is obtained.

In contrast to the presently claimed invention, Chen discloses an electrode containing a metal or alloy layer (Au-rich layer) that is parted in plural portions and a metal oxide layer (NiO

layer) that is continuous. Specifically, Figure 7(d) of Chen illustrates that the metal oxide layer (NiO layer) is continuous and the metal or alloy layer (Au-rich layer) exists in the form of islands in the continuous metal oxide layer (NiO layer), which does not correspond to the presently claimed invention. Therefore, Applicant respectfully submits that, as is seen from a comparison of Figure 1 in the present specification and Figure 7(d) of Chen, the distribution of the metal or alloy layer and the metal oxide layer in Chen differs with that in the presently claimed invention.

Accordingly, Applicant respectfully submits that Chen does not anticipate or render obvious the present claims, and Applicant respectfully requests the reconsideration and withdrawal of the rejection.

Response to rejections of claims 2 and 16 under 35 U.S.C. § 103(a) based upon Chen in view of either Sheu or ChenJ

Applicant respectfully submits that neither Sheu nor ChenJ remedy the above deficiencies within Chen. Namely, Sheu was cited for its alleged teaching of the use of Ga in the first layer, and ChenJ was cited for its teaching of the gallium nitride-based compound semiconductor light-emitting device of claim 16. Neither of these teachings remedy the deficiencies discussed above with respect to Chen, i.e., that Chen does not disclose or teach the presently claimed first continuous layer and second plurally parted layer.

Applicant therefore respectfully submits that the combined teachings of Chen and Sheu do not anticipate or render obvious claim 2 and also that the combined teachings of Chen and ChenJ do not anticipate or render obvious claim 16.

Applicant respectfully requests the reconsideration and withdrawal of these rejections.

AMENDMENT UNDER 37 C.F.R. § 1.111
Appln. No. 10/572,680

Atty. Docket No. Q77727

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Abraham J. Rosner
Registration No. 33,276

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

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